

## PATIENT CARE EQUIPMENT SUPPORT SYSTEM

## CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C. 119(e) to U.S.

- 5 Provisional Application Serial No. 60/510,756, entitled "PATIENT EQUIPMENT SUPPORT SYSTEM," filed October 13, 2003, which is expressly incorporated by reference herein.

## FIELD OF THE INVENTION

- 10 The present disclosure relates to a system for supporting patient care equipment adjacent to a patient support such as a hospital bed, and more particularly relates to a system for supporting patient care equipment that facilitates transfer of patient care equipment between a patient support and a support structure such as a stand, a service column, a cart, a wall of a hospital room or a headwall.

15

## BACKGROUND OF THE INVENTION

- Hospitalized patients often require patient care equipment to be in close proximity during hospital care. Such patient care equipment is typically supported on a patient care equipment rack. Illustratively, the patient care equipment includes heart monitoring equipment, medical gas delivery equipment, infusion management systems, intra-venous bags, equipment monitors, defibrillators, and the like, many of which directly connect to the patient via lines or tubes.

## SUMMARY OF THE INVENTION

- 25 The present invention comprises one or more of the following features or elements in the appended claims or combinations thereof.

- An apparatus is provided for use with a patient care equipment rack. Illustratively, the apparatus includes a rail configured to be coupled to a support structure such as hospital bed, a carriage coupled to the rail for movement along the rail and a lock coupled to the carriage for locking the carriage at a selected one of a plurality of locations along the rail. The carriage is configured to support a patient care equipment rack, such as an IV pole.
- 30

-2-

The rail may have a plurality of locking portions spaced therealong. The lock may be movable between a locking position where a portion of the lock engages a selected one of the locking portions to block the carriage from moving along the rail and an unlocking position where the portion of the lock disengages from the selected one of the locking portions to allow the carriage to move along the rail.

The support structure may be one of a hospital bed, surgery table, an ambulatory care chair, a stand, a service column, a cart, a wall of a hospital room and a headwall. The patient care equipment rack may be configured to carry any desired patient care equipment including, but not limited to, any one or more of the following:

heart monitoring equipment, medical gas delivery equipment, infusion management systems, equipment monitors, defibrillators, and the like.

Illustratively, the locking portions in the rail comprise lock-receiving spaces, and the lock comprises a pin configured for reception in a selected one of lock-receiving spaces in the rail to lock the carriage at the selected position. The pin may be biased toward the locking position by a spring.

The carriage may comprise an upwardly opening socket, and the patient care equipment rack may comprise a downwardly extending post configured for reception in the socket. Illustratively, the socket has a tapered inner surface that varies in width from wide to narrow in a downward direction, and the post has a complementary outer surface to facilitate engagement between the patient care equipment rack and the carriage.

Illustratively, the frame has a first end, a second end, a first side, a second side, and four corners. The rail illustratively extends substantially along one of the first end, the second end, the first side and the second side between two corners of the frame. The carriage may be lockable at a selected one of a plurality of positions along the rail between the two corners.

Thus, a patient support such as a hospital bed is provided for use with a patient care equipment rack having a downwardly extending post. Illustratively, the patient support comprises a lower frame, an upper frame supported above the lower frame and movable relative to the lower frame between a raised position and a lowered position, a rail coupled to the upper frame, and a carriage coupled to the rail for movement along the rail. The carriage illustratively has an upwardly opening socket for receiving the downwardly extending post of the patient care equipment

-3-

rack so that the patient care equipment rack is transferred from a support structure, such as a stand, carrying the patient care equipment support rack to the patient support as the upper frame is raised or the support structure is lowered while the downwardly extending post is generally aligned with the upwardly opening socket. Likewise, the patient care equipment rack may be transferred from the patient support to a support structure when the upper frame is lowered or the support structure is raised.

Features of the present disclosure will become apparent to those skilled in the art upon consideration of the following detailed description of illustrative embodiments exemplifying the best mode of carrying out the present disclosure as presently perceived.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The detailed description particularly refers to the accompanying figures, in which:

Fig. 1 is a perspective view of a hospital bed showing a patient care equipment support system having a guide rail at the head end of the hospital bed, a carriage coupled to the rail for movement therealong, an IV pole supported by the carriage and a lock for locking the carriage at a selected one of a plurality of locations along the rail,

Fig. 2 is cross sectional view showing the rail, the IV pole having a downwardly extending post, the carriage having an upwardly opening socket for receiving the post, a pair of rollers riding on the top side of the rail and a pair of rollers riding on the under side of the rail, and further showing the lock having an end portion received in a lock-receiving space in the rail,

Fig. 3 is a perspective view showing a patient care equipment support system similar to the system of Fig. 1 on a patient examining table,

Fig. 4 is a perspective view showing a patient care equipment support system similar to the system of Fig. 1 on a patient chair,

Fig. 5 is a perspective view showing a patient care equipment support system similar to the system of Fig. 1 on a wall in a hospital room,

Fig 6 is a perspective view of a patient care equipment rack which may be coupled to the carriage of any one of the systems shown in Figs. 1-5 in lieu of the IV pole, and

-4-

Fig. 7 is a diagrammatic view showing the rail coupled to a side of the hospital bed instead of an end thereof.

#### DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

5 For the purposes of promoting an understanding of the principles of the present invention, reference will be made to a number of illustrative embodiments shown in the accompanying drawings and the following description thereof.

Fig. 1 shows a patient care equipment support system 100 for use with a patient support, such as a hospital bed 20. The patient care equipment support  
10 system 100 supports a patient care equipment rack, such as an IV pole 102, in close proximity to a patient 22. In Fig. 1, the patient support is illustratively a hospital bed 20 positioned in a patient room of a hospital or healthcare facility. However, it should be understood that the patient support may very well be a stretcher, a surgery table, an ambulatory care chair, and the like. Also, it should be understood that the patient  
15 support may be used in different settings such as, for example, intensive care rooms, operating rooms and physician offices.

In Fig. 1, the illustrative patient care equipment rack is an IV pole 102 for supporting an IV container 104. However, it should be understood that the patient care equipment rack may very well be any support, such as a rack 106 shown in Fig.  
20 6, for supporting any desired type of patient care equipment including any one or more of the following: heart monitoring equipment, medical gas delivery equipment, infusion management systems, equipment monitors, patient monitors, defibrillators, and the like, many of which are directly connected to a patient via lines or tubes. The rack 106 has a downwardly extending post 108. The term "rack" is used in the  
25 specification and claims to mean a frame, a support, a stand and the like for supporting patient care equipment. U.S. Patent Application (7175-74605), Serial No. 10/802,289, titled "PATIENT CARE EQUIPMENT MANAGEMENT SYSTEM," filed March 17, 2004 (now U.S. Patent Application Publication No. \_\_\_\_\_), discloses such patient care equipment rack and is  
30 incorporated by reference herein.

The hospital bed 20 illustratively includes a lower frame 24 supported on casters 26, an upper frame 28 supported above the lower frame 24 for movement relative to the lower frame 24 between a raised position and a lowered position, a

-5-

deck 30 supported above the upper frame 24, and a mattress 32 supported by the deck 30. An elevation adjustment mechanism 34 connects the upper frame 28 to the lower frame 24. The mechanism 34 may be driven by a suitable actuator to cause the upper frame 28 to move relative to the lower frame 24. As shown in Fig. 7, the upper frame 28 has a head end 40, a foot end 42, a first side 44, a second side 46, a longitudinal axis 48 and four corners 50, 52, 54, 56. Illustratively, as shown in Figs. 1 and 2, the upper frame 28 includes a head-end frame member 36, which is configured to extend horizontally along the head end 40 of the upper frame 28 between two corners 50, 52. Illustratively, the head-end frame member 36 extends beyond the outer periphery of deck 30, and supports push handles 60 and rolling bumpers 62. It will be appreciated that such hospital beds are well known. For example, U.S. Patent No. 5,317,769 to Weismiller discloses such a hospital bed and is incorporated herein by reference.

The patient care equipment support system 100 includes a guide rail 110 coupled to the frame member 36, a carriage 112 coupled to the rail 110 for movement along the rail 110, and a lock 114 for selectively locking the carriage 112 at a selected one of a plurality of locations along the rail 110. The IV pole 102 has a downwardly extending post 116 for reception in an upwardly opening tapered socket 118 in the carriage 112. The rail 110 has a plurality of locking portions, such as lock-receiving spaces 120, spaced therealong. The lock-receiving spaces 120 can be formed at suitable locations along the rail 110, and are illustratively spaced at equal increments along the rail 110.

As shown in Fig. 2, the lock 114 comprises a pin 122 configured for reception in a selected one of lock-receiving spaces 120 in the rail 110. The pin 122 is movable between a locking position shown in solid in Fig. 2 where an end portion 124 of the pin 122 engages a selected one of the lock-receiving spaces 120 to block the carriage 112 from moving along the rail 110 and an unlocking position shown in phantom in Fig. 2 where the end portion 124 of the pin 122 disengages from the selected one of the lock-receiving spaces 120 to allow the carriage 112 to move along the rail 110. A compression spring 126 biases the pin 122 toward the locking position. The pin 122 includes a pull knob 128 at one end thereof. The pull-knob 128 can be pulled to pull the end portion 124 of the pin 122 away from the lock-receiving spaces 120 in the rail 110 to free the carriage 112 to move along the rail 110.

-6-

Illustratively, the rail 110 has a generally rectangular tubular cross section. The lock-receiving spaces 120 are illustratively apertures that extend through a side wall of the rail 110 spaced from the frame member 36. In alternative embodiments, the rail 110 may be solid and the lock-receiving spaces 120 may be apertures that extend partially through the rail 110. Although the illustrative embodiment utilizes a pull-knob and a detent-type lock, variations of the position-locking systems, such as a latch, a pawl, an infinitely adjustable clamp, and the like, are within the scope of the present disclosure.

In Fig. 1, the illustrative patient care equipment support system 100 is used with a hospital bed 20. However, it should be understood that the patient care equipment support system 100 may very well be used with any support structure, such as a stretcher, a surgery table, a stand, a service column, a cart, a wall in a hospital room, a headwall, and the like. For example, in Fig. 3, the illustrative patient care equipment support system 100 is used with a patient examining table 130. In Fig. 4, the illustrative patient care equipment support system 100 is used with a patient chair 132. In Fig. 5, the illustrative patient care equipment support system 100 is mounted to a wall 134 in a hospital room.

Illustratively, the downwardly extending post 116 has a frustoconical tapered end portion 140 for facilitating engagement with a complementary upwardly facing frustoconical opening 142 in the socket 118 even when the alignment between the two is slightly off as the IV pole 102 is lowered to engage the carriage 112 or the carriage 112 is raised to engage the IV pole 102. The tapered end portion 140 varies in diameter from wide to narrow in a downward direction. It should be understood, however, that other approaches by which the carriage 112 engages and supports the IV pole 102 are within the scope of this disclosure. For example, the carriage 112 could have an upwardly extending post (not shown), while the IV pole 102 could have a downwardly opening socket (not shown). Alternatively, the carriage 112 could have a suitable first coupler and the IV pole 102 could have a complementary second coupler.

In Fig. 1, the rail 110 extends horizontally along the head end 40 of the upper frame 28 between two corners 50, 52. Illustratively, the rail 110 has a central portion 150 disposed between two connecting portions 152. The head-end frame member 36 includes forwardly extending flanges 154 to which the connecting

-7-

portions 152 of the rail 110 are attached such that the rail 110 extends generally horizontally along the head end 40 in a direction generally perpendicularly to the longitudinal axis 48. Alternatively, the rail 110 may extend along any one of following portions of the upper frame 28: the foot end 42, the first side 44 and the  
5 second side 46. Illustratively, Fig. 7 diagrammatically shows the rail 110 extending along the second side 46 of the upper frame 28.

Referring to Fig. 2, the carriage 112 includes a housing 160, a socket-receiving sleeve 162, a sleeve mounting plate 164, a roller mounting plate 166, rollers 168 and a mounting block 170. Illustratively, there are four rollers 168. Two rollers  
10 168 engage the top side 172 of the rail 110, and two rollers 168 engage the under side 174 of the rail 110. Pins 176 rotatably secure the rollers 168 to the roller mounting plate 166. The roller mounting plate 166 is secured to the mounting block 170 by suitable fasteners (not shown). Each roller 168 has a circumferential v-shaped guide groove 178 along the outer periphery thereof. The rail 110 has a pair of  
15 complementary inverted v-shaped laterally extending raised track portions 180 on the opposite sides thereof for rollably engaging the guide grooves 178 of the rollers 168.

Illustratively, the housing 160 is made from a suitable plastic material. The sleeve 162, the sleeve mounting plate 164, the roller mounting plate 166, the mounting block 170 and the posts 108 and 116 are illustratively made from steel. The  
20 socket 118 is illustratively made from a different material than steel, such as brass or aluminum bronze, to allow the post 108 of the equipment rack 106 and the post 116 of the IV pole 102 to rotate in the socket 118 without galling the mating surfaces. Illustratively, the rail 110 is made from steel, and the rollers 168 are made from a suitable material, such as stainless steel. Illustratively, the housing 160 comprises a  
25 left half 182 and a right half 184. The housing halves 182, 184 are secured to the sleeve mounting plate 164 by screws. Two-piece construction of the housing 160 facilitates installation of the carriage 112 on the rail 110.

In the illustrated embodiment, the rail 110 has inverted v-shaped raised track portions 180, and the rollers 168 have complementary circumferential v-shaped  
30 grooves 178. Alternatively, the rail 110 may have v-shaped grooves and the rollers 168 may have complementary circumferential v-shaped raised portions. In some embodiments, the grooves and the complementary raised portions in the rail 110 and the rollers 168 may have a rectangular or rounded cross sections. In some

-8-

embodiments, sliding elements may be substituted for the rollers 168. In alternative embodiments, the rollers 168 may be dispensed with, and the carriage 112 may be directly mounted on the rail 110.

The lock 114 includes a housing 186 and a washer 188. The housing 186 has a head portion, a threaded portion, a large diameter bore and a small diameter bore. The large and small diameter bores in the housing 186 define an annular shoulder portion. The locking pin 122 has a large diameter portion and a small diameter portion. The large and small diameter portions of the locking pin 122 define an annular shoulder portion. The large and small diameter portions of the locking pin 122 are received in the respective large and small diameter bores in the housing 186 for longitudinal movement therein. The small diameter portion of the locking pin 122 extends through the interior region of the compression spring 126. The spring 126 is situated in a state of compression in the large diameter bore in the housing 186 between the two annular shoulder portions defined by the large and small diameter bores in the housing 186 and the large and small diameter portions of the locking pin 122. The spring 126 biases the locking pin 122 inwardly toward the locking position. An end portion of the small diameter portion 196 of the locking pin 122 is secured to the pull knob 128. The roller mounting plate 166 and the mounting block 170 have a pair of longitudinally extending threaded openings for threadably receiving the threaded portion of the housing 186.

Thus, a hospital bed 20 is provided for use with a patient care equipment rack 106 having a downwardly extending post 108. The hospital bed 20 includes a lower frame 24, a plurality of casters 26 to support the lower frame 24 and an upper frame 28 supported above the lower frame 24 and movable relative to the lower frame 24 between a raised position and a lowered position. A rail 110 is coupled to the upper frame 28 to extend substantially along the head end 40 of the upper frame 28. A carriage 112 is coupled to the rail 110 for movement along the rail 112. The carriage 112 is lockable at a selected one of a plurality of locations along the rail 110. The carriage 112 has an upwardly opening socket 118 for receiving the downwardly extending post 116 of the patient care equipment rack 106 so that the patient care equipment rack 106 is transferred from a support structure, such as a mobile stand, a service cart, an ambulatory chair, and the like, to the patient support 20 when the downwardly extending post 108 is generally aligned with the upwardly



-9-

opening socket 118 and the upper frame 28 is raised or the support structure carrying the patient care equipment rack 106 is lowered. Likewise, the patient care equipment rack 106 is transferred from the hospital bed 20 to a support structure when the upper frame 28 is lowered or the support structure is raised. Reference is made to the  
5 above-mentioned U.S. Patent Application (7175-74605), Serial No. 10/802,289, titled "PATIENT CARE EQUIPMENT MANAGEMENT SYSTEM," filed March 17, 2004 (now U.S. Patent Application Publication No. \_\_\_\_\_), for additional examples of how the patient care equipment rack is transferred between a hospital bed and a stand.

10 Although the invention has been described in detail with reference to certain illustrative embodiments, variations and modifications exist with the scope and spirit of this disclosure as described and defined in the following claims.

-10-

## CLAIMS:

1. An apparatus for use with a patient care equipment rack, the apparatus comprising:
  - 5 a rail configured to be coupled to a support structure, the rail having a plurality of locking portions spaced therealong,
  - a carriage coupled to the rail for movement along the rail, the carriage configured to support the patient care equipment rack, and
  - a lock coupled to the carriage and movable between a locking position
  - 10 where a portion of the lock engages a selected one of the locking portions to block the carriage from moving along the rail and an unlocking position where the portion of the lock disengages from the selected one of the locking portions to allow the carriage to move along the rail.
2. The apparatus of claim 1, wherein the support structure
- 15 comprises one of a hospital bed, a stretcher, a surgery table, an ambulatory care chair, a stand, a service column, a cart, a wall in a hospital room and a headwall.
3. The apparatus of claim 1, wherein the patient care equipment rack comprises one of an IV pole and a rack adapted to carry infusion equipment.
4. The apparatus of claim 1, wherein the locking portions in the
- 20 rail comprise lock-receiving spaces, and the lock comprises a pin configured for reception in a selected one of lock-receiving spaces in the rail.
5. The apparatus of claim 4, wherein the pin is biased toward the locking position by a spring.
6. The apparatus of claim 5, wherein the pin comprises a pull
- 25 knob.
7. The apparatus of claim 1, wherein the carriage comprises an upwardly opening socket, and the patient care equipment rack comprises a downwardly extending post configured for reception in the socket.
8. The apparatus of claim 7, wherein the socket has a tapered
- 30 inner surface that varies in width from wide to narrow in a downward direction, and the post has a complementary outer surface.
9. The apparatus of claim 7, wherein the carriage comprises a roller rollably engaging the rail.

-11-

10. The apparatus of claim 7, wherein the rail comprises a raised track portion for guiding the carriage along the rail.

11. The apparatus of claim 10, wherein the raised track portion has an inverted v-shaped cross section.

5 12. The apparatus of claim 10, wherein the carriage comprises a roller having a circumferential groove configured to rollably engage the raised track portion.

13. A patient support for use with a patient care equipment rack, the patient support comprising:

10 a frame having four corners,  
a rail coupled to the frame, the rail extending between two of the four corners, the rail having a plurality of locking portions spaced therealong,

a carriage coupled to the rail for movement along the rail between the two corners of the frame, the carriage configured to support the patient care  
15 equipment rack, and

a lock coupled to the carriage and movable between a locking position where a portion of the lock engages a selected one of the locking portions to block the carriage from moving along the rail and an unlocking position where the portion of the lock disengages from the selected one of the locking portions to allow the carriage  
20 to move along the rail.

14. The patient support of claim 13, wherein the frame has a first end, a second end, a first side, a second side, and the rail extends substantially along one of the first end, the second end, the first side or the second side between the two corners.

25 15. The patient support of claim 13, wherein the carriage comprises an upwardly opening socket, and the patient care equipment rack comprises a downwardly extending post configured for reception in the socket.

16. The patient support of claim 15, wherein the socket has a tapered inner surface that varies in width from wide to narrow in a downward  
30 direction, and the post has a complementary outer surface.

17. A patient support for use with a patient care equipment rack having a downwardly extending post, the patient support comprising:

a lower frame,

-12-

an upper frame supported above the lower frame and movable relative to the lower frame between a raised position and a lowered position, the upper frame having a first end, a second end, a first side, a second side and four corners,

a rail coupled to the upper frame, the rail extending substantially along  
5 one of the first end, the second end, the first side and the second side of the upper frame between two of the four corners, and

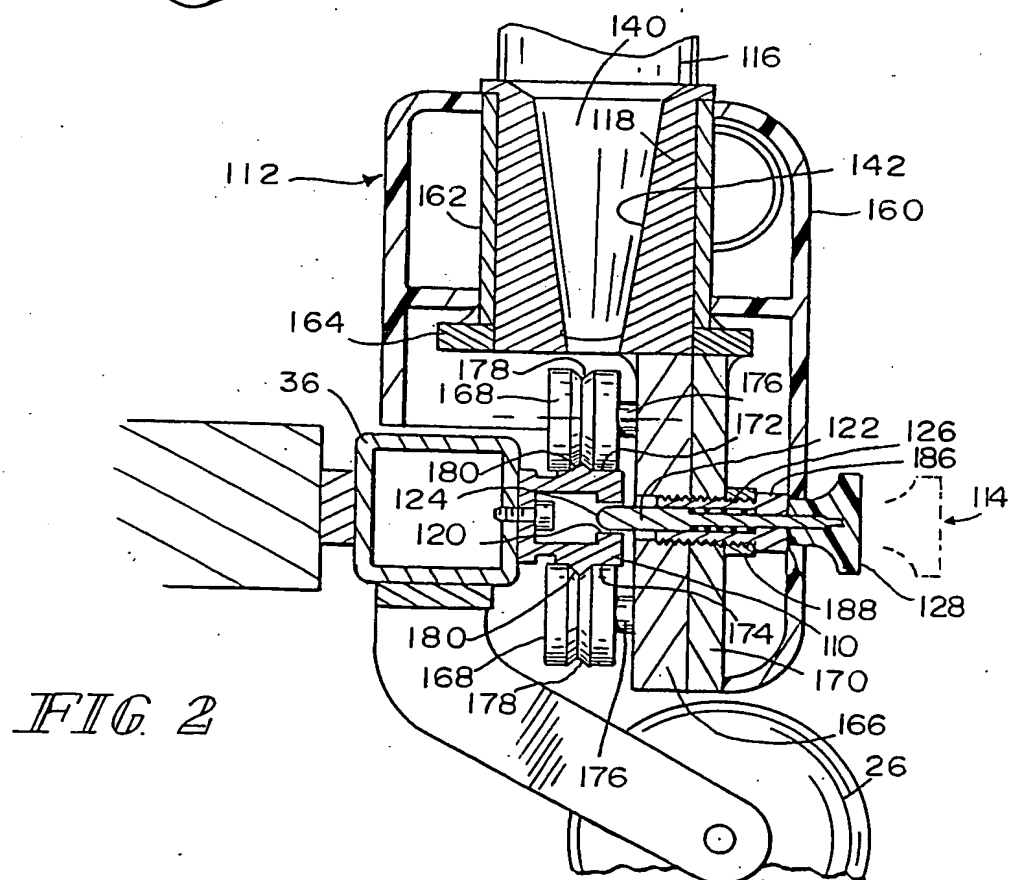
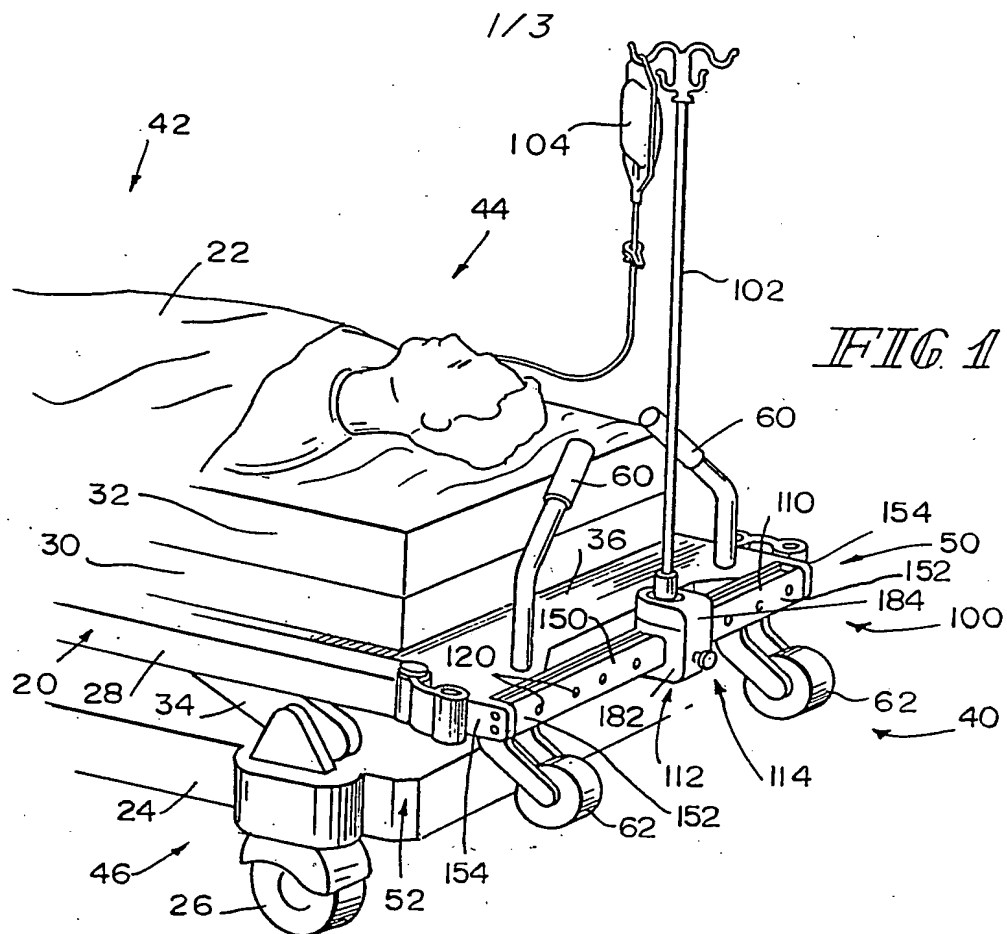
a carriage coupled to the rail for movement along the rail, the carriage having an upwardly opening socket for receiving the downwardly extending post of the patient care equipment rack so that the patient care equipment rack is transferred  
10 from a support structure carrying the patient care equipment rack to the patient support as the upper frame is raised or the support structure lowered while the downwardly extending post is generally aligned with the upwardly opening socket.

18. The patient support of claim 17, wherein the patient care equipment rack is transferred from the patient support to a support structure as the  
15 upper frame is lowered or the support structure is raised.

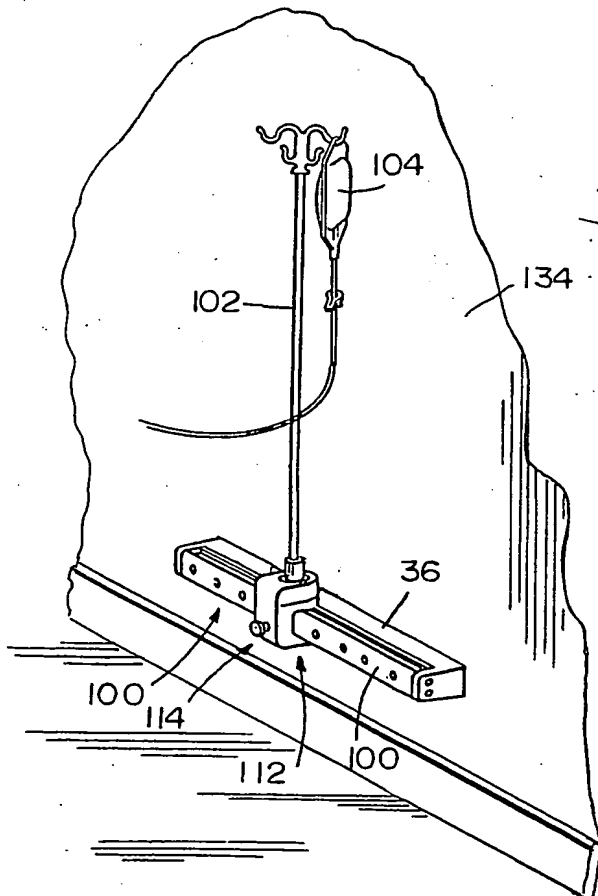
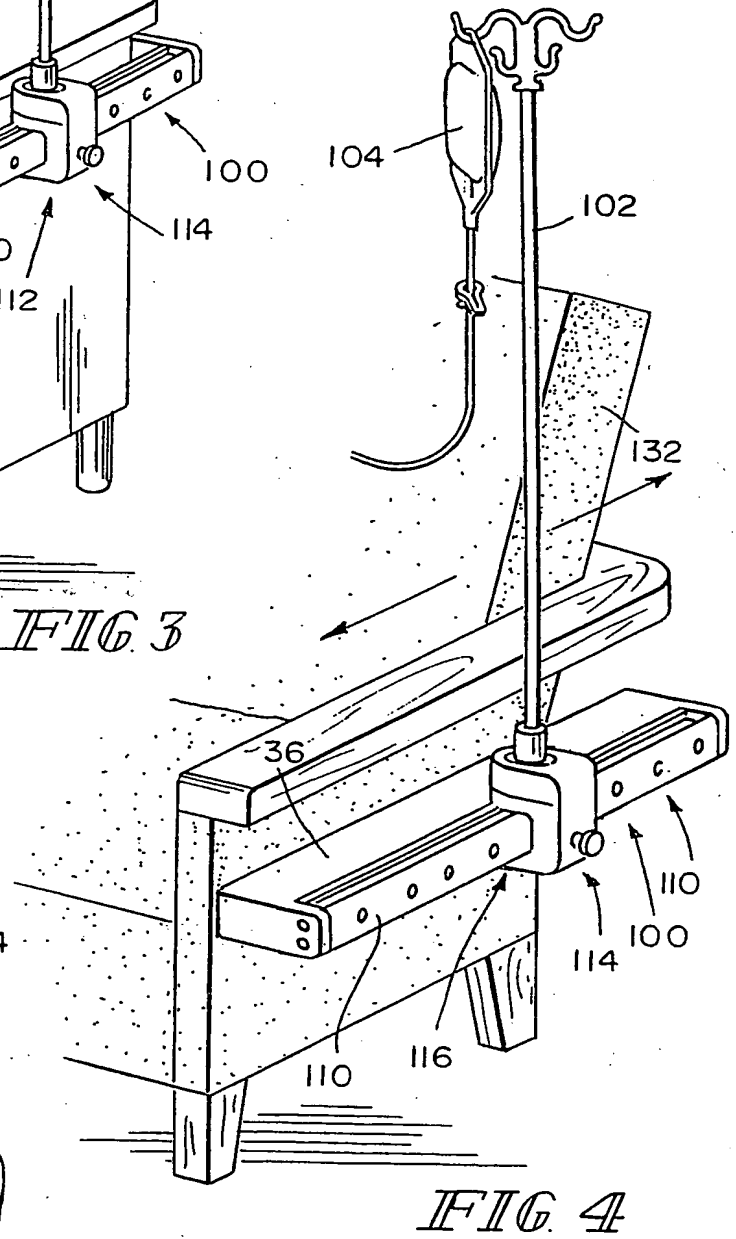
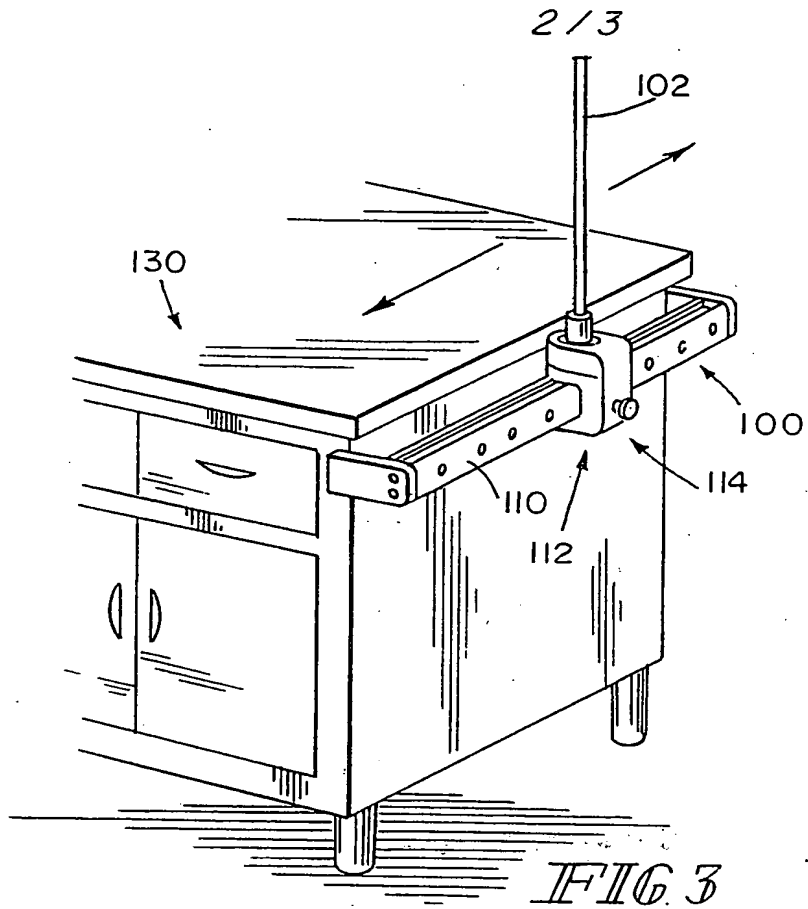
19. The patient support of claim 18, wherein the carriage is lockable at a selected one of a plurality of locations along the rail.

20. The apparatus of claim 17, wherein the socket has a tapered inner surface that varies in width from wide to narrow in a downward direction, and  
20 the post has a complementary outer surface.

21. The patient support of claim 17, comprising a deck supported above the upper frame, wherein the upper frame includes a frame member configured to extend horizontally beyond the periphery of deck between the two corners of the upper frame and the rail is coupled to the frame member.



**THIS PAGE BLANK (USPTO)**



**THIS PAGE BLANK (USPTO)**



3/3

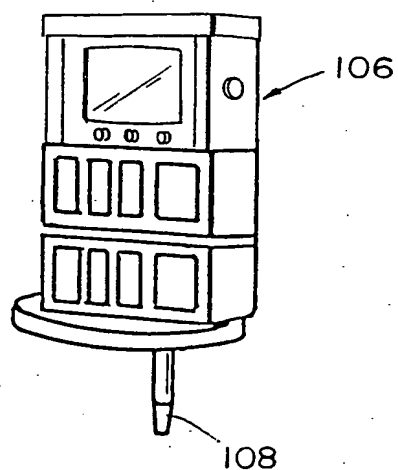


FIG. 6

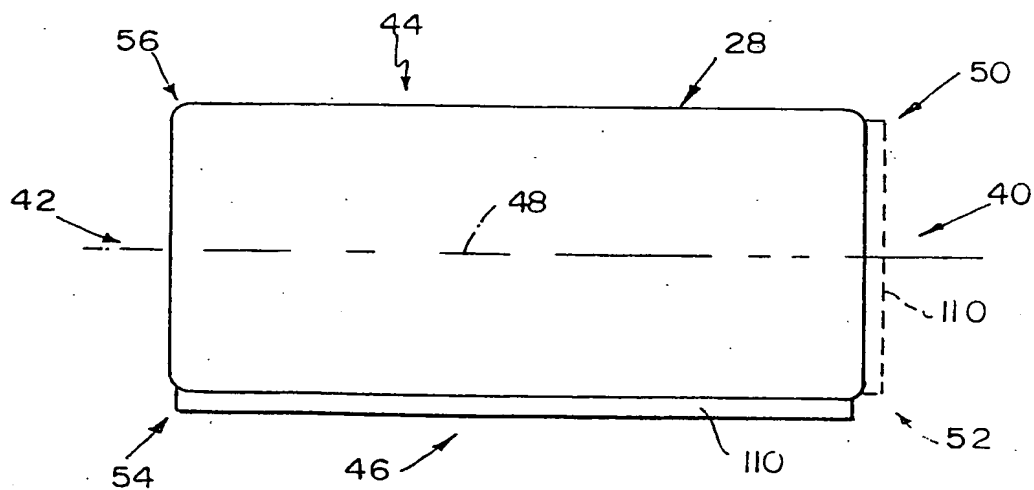


FIG. 7

**THIS PAGE BLANK (USPTO)**

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☒ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**

**THIS PAGE BLANK (USPTO)**